
Release of UF₆ From a Ruptured Model 48Y Cylinder at Sequoyah Fuels Corporation Facility: Lessons-Learned Report

NRC Staff Responses to the Recommendations Made by
the Lessons-Learned Group

**U.S. Nuclear Regulatory
Commission**



NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 1717 H Street, N.W.
Washington, DC 20555
2. The Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082,
Washington, DC 20013-7082
3. The National Technical Information Service, Springfield, VA 22161

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC Office of Inspection and Enforcement bulletins, circulars, information notices, inspection and investigation notices; Licensee Event Reports; vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the GPO Sales Program: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, and NRC booklets and brochures. Also available are Regulatory Guides, NRC regulations in the *Code of Federal Regulations*, and *Nuclear Regulatory Commission Issuances*.

Documents available from the National Technical Information Service include NUREG series reports and technical reports prepared by other federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission.

Documents available from public and special technical libraries include all open literature items, such as books, journal and periodical articles, and transactions. *Federal Register* notices, federal and state legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free, to the extent of supply, upon written request to the Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, 7920 Norfolk Avenue, Bethesda, Maryland, and are available there for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

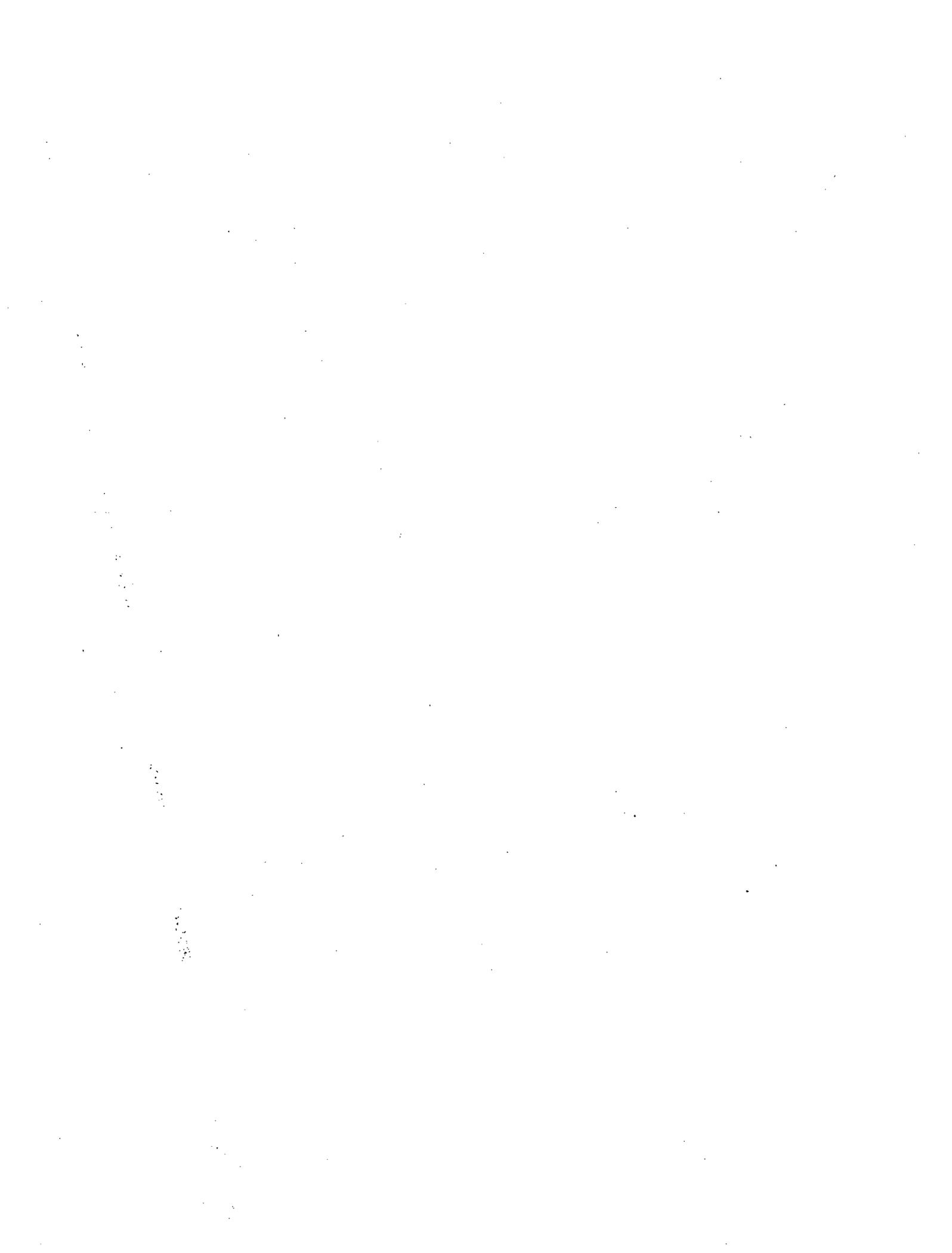
Release of UF₆ From a Ruptured Model 48Y Cylinder at Sequoyah Fuels Corporation Facility: Lessons-Learned Report

NRC Staff Responses to the Recommendations Made by
the Lessons-Learned Group

Manuscript Completed: August 1986
Date Published: August 1986

U.S. Nuclear Regulatory Commission
Washington, DC 20555





INTRODUCTION

On January 4, 1986, an accident occurred at the Sequoyah Fuels Corporation uranium hexafluoride production facility in Gore, Oklahoma, that resulted in the death of one plant worker and injuries to several others. The U.S. Nuclear Regulatory Commission review of the causes of the accident, the responses to the accident, the effects of the accident on public health, safety, and the environment, and corrective actions to prevent similar accidents from happening have been extensive and are continuing.

One component of the NRC's review of this accident has been to identify actions that NRC and its licensees might reasonably take to improve protection of the public health and safety. On February 20, 1986, the Acting Executive Director for Operations formed a Lessons Learned Group to prepare a report based on experience gained from this accident. The goal of the Lessons Learned Group was to identify actions NRC might reasonably take from a licensing and inspection standpoint to prevent similar accidents, as well as to clarify NRC's regulatory role regarding facilities of this type. A further goal was to assess the adequacy of the NRC response to the accident as well as the follow-on activities.

The observations and recommendations of the Lessons Learned Group were published in NUREG-1198, "Release of UF₆ From A Ruptured Model 48Y Cylinder At Sequoyah Fuels Corporation Facility: Lessons Learned Report," June 1986. The staff have completed their consideration of the 58 recommendations made in this report, and a response to each is provided in this document.

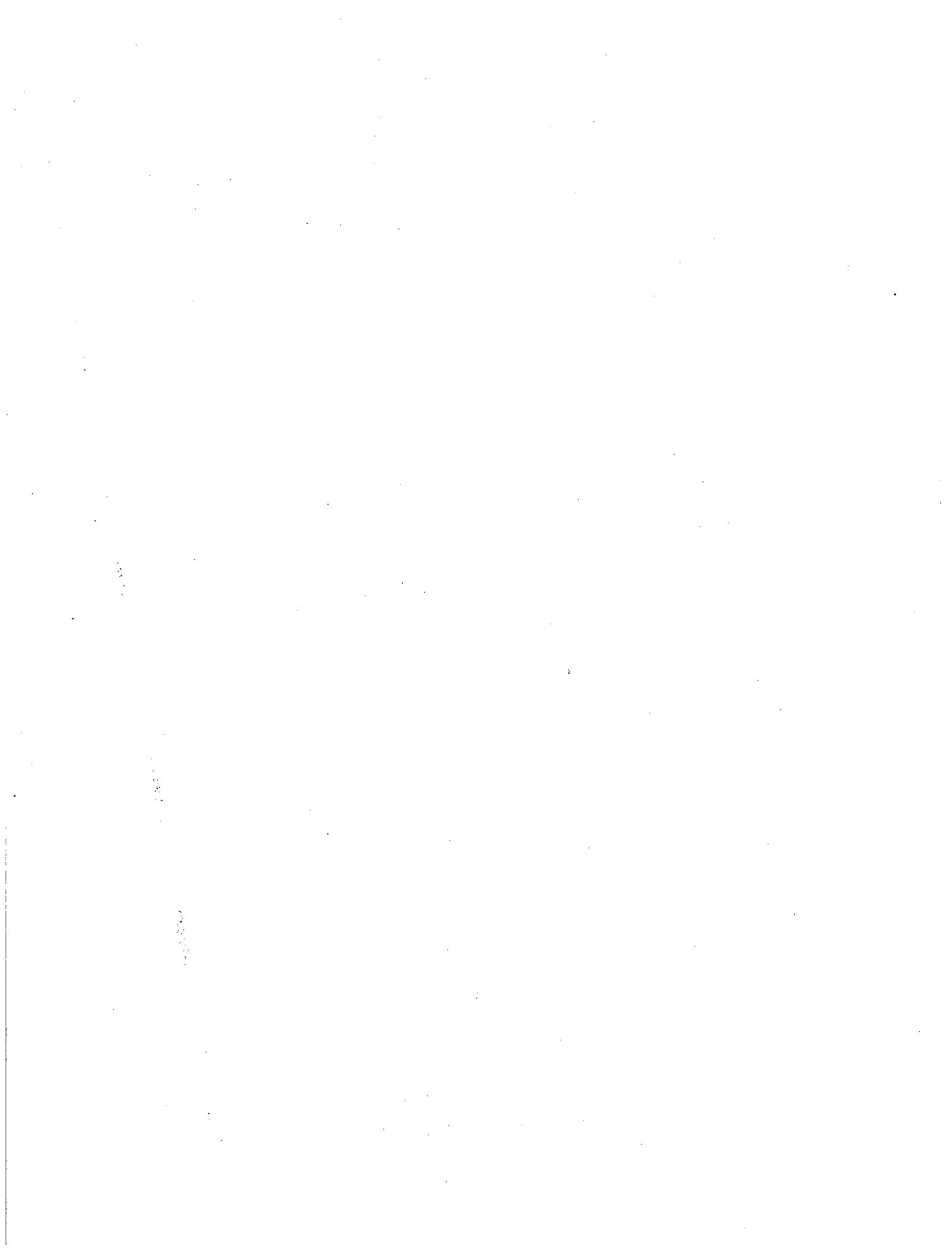
In developing a response to each of the recommendations, the staff considered actions that should be taken: (1) for the restart of the Sequoyah Fuels facility; (2) to make near term improvements; and (3) to improve the regulatory framework. Actions to identify further improvements to the licensing and inspection programs are continuing and will be completed in a few months. These improvements will be suggested by several continuing studies including that of the Materials Safety Regulation Review Study Group and the legal analysis being prepared by the Office of the General Counsel on NRC's jurisdiction over chemical hazards. Recommendations in these issuances will be combined with the current efforts, to prepare a complete picture of the adequacy of the existing licensing and inspection programs to fulfill NRC's legal requirements and protect workers, public health and safety, and the environment.

TABLE OF CONTENTS

1.	INTRODUCTION.....	iii
2.	PROCESS AND FACILITY DESIGN	
2.1	Overpressurization Monitoring	
	Response to Recommendations.....	1
2.2	Monitoring of Filling	
	Response to Recommendations.....	4
2.3	Facility Operations	
	Response to Recommendations.....	6
2.4	Cylinder Specifications	
	Response to Recommendations.....	8
2.5	Monitoring of UF ₆ Releases	
	Response to Recommendations.....	10
3.	RADIOLOGICAL CONTINGENCY PLANNING AND RESPONSES TO INCIDENT	
3.1	Licensee's Contingency Plan	
3.1.1	Plan Maintenance	
	Response to Recommendations.....	12
3.1.2	Training	
	Response to Recommendations.....	14
3.1.3	Exercises and Drills	
	Response to Recommendations.....	16
3.1.4	Facilities and Equipment	
	Response to Recommendation.....	18
3.2	NRC Response	
3.2.1	Headquarters and Region IV Activities	
	Response to Recommendations.....	22

3.2.2	Regional Response to Event	
3.2.2.1	Notification	
	Response to Recommendation.....	25
3.2.2.2	Onsite Response	
	Response to Recommendations.....	26
3.3	Responses of Other Federal Agencies and Other Groups	
3.3.1	Other Federal Agencies	
	Response to Recommendation.....	31
3.3.2	Oklahoma Department of Health	
3.3.2.1	Sequoyah County Department of Health	
	Response to Recommendations.....	32
3.3.3	Sequoyah Memorial Hospital, Sallisaw, Oklahoma	
	Response to Recommendations.....	34
3.3.4	Local Police and State Highway Patrol	
	Response to Recommendation.....	35
4.0	FEDERAL AND STATE AGENCY INTERFACES	
4.1	NRC-OSHA Interface	
	Response to Recommendations.....	36
4.2	NRC-EPA Interface	
	Response to Recommendation.....	38
5.	AUGMENTED INSPECTION TEAM AND INCIDENT INVESTIGATION TEAMS	
5.2	Incident Investigation Team	
	Response to Recommendation.....	39
6.0	HEALTH EFFECTS REPORT	
	Response to Recommendations.....	41

7.0	PRIOR EVENTS AT UF ₆ CONVERSION FACILITIES	
	Response to Recommendations.....	45
8.0	FUEL FACILITY LICENSING PROGRAM	
8.1	Source Materials Licensing	
	Response to Recommendations.....	47
8.2	Radiological Contingency Plans For Nonreactor Facilities	
	Response to Recommendations.....	51
9.0	FUEL FACILITY INSPECTION PROGRAM	
9.1	Inspection Program and Procedures	
	Response to Recommendations.....	53
9.2	Training and Qualification	
	Response to Recommendations.....	56



Pressure-sensing instrumentation should be connected to UF₆ cylinders and cold traps any time heat is applied to them. Heat should not be applied to UF₆ cylinders or cold traps unless there is verification that a vent path is open to the associated pressure-sensing instrumentation. The pressure-sensing instrumentation should provide both alarm and visual display functions.

Discussion:

The licensing staff agree that this recommendation should be implemented and will take the actions necessary to incorporate this recommendation in license requirements.

Pressure-sensing instruments were not present when the overfilled UF₆ cylinder was heated at Sequoyah Fuels on January 4. Had this type of instrumentation been present and monitored, the overpressure condition could have been recognized and heating terminated before pressures reached the rupture point for the cylinder.

Sequoyah Fuels Corporation is providing pressure-sensing instrumentation on a steam chest for cylinders being heated. The pressure sensor will provide both local and control room alarms. Chapter 6 of the license conditions provides a requirement that UF₆ cylinders will not be heated in steam chests unless the pressure-sensing instrumentation is operable. Instrumentation of this type is already present on the cold traps.

Approach:

The staff will survey other licensees using similar processes and provide recommendations and requirements as necessary.

The appropriate regulatory documents will be revised to incorporate this requirement.

Provisions should be made for overpressure relief or automatic heat termination upon overpressurization any time heat is applied to UF₆ cylinders or cold traps.

Discussion:

The licensing staff agree with this recommendation as an automatic safeguard against overpressure consequences and will take the actions necessary to incorporate this recommendation in license requirements.

Many licensees already provide such systems for UF₆ heating, and such a system was part of the design submitted by Sequoyah Fuels for the new depleted UF₆ to UF₄ conversion facility.

The pressure-sensing instrumentation being installed on a steam chest at the Sequoyah facility will be interlocked with the steam heating system to automatically terminate heating (see previous response). The cold traps used at the Sequoyah facility relieve to a dump tank equipped with a rupture disk to safeguard against overpressure consequences.

Approach:

The staff will survey other licensees using similar processes and will provide recommendations and requirements as appropriate.

The appropriate regulatory documents will be revised to incorporate this requirement.

The use of autoclaves for heating UF₆ cylinders should be evaluated in terms of providing an additional margin of safety.

Discussion:

The licensing staff agree with this recommendation.

The staff have not evaluated the relative merits of atmospheric steam chests and autoclaves for heating UF₆ cylinders, but believes such a comparison to be plant specific.

Members of NMSS staff visited DOE's gaseous diffusion plant at Paducah, Kentucky, to evaluate their UF₆ handling procedures including their use of autoclaves. Most of the autoclaves at Paducah are low pressure units that would not have contained the cylinder that ruptured at Sequoyah.

Approach:

The staff is requesting that Allied Chemical evaluate the use of autoclaves vs. atmospheric steam chests and provide the staff their justification for choosing one over the other. Sequoyah Fuels is currently performing this evaluation. A similar evaluation will be requested of other licensees handling UF₆ that do not presently use autoclaves. These licensees include: General Electric, Wilmington, NC; Exxon Nuclear, Richland, WA; Combustion Engineering, Hematite, MO; and Nuclear Fuel Services, Erwin, TN. Westinghouse Electric in Columbia, SC, uses autoclaves. The staff will have an independent contractor, expert in the operation of steam chests and autoclaves, review the reports received from the licensees and provide an independent assessment. The licensing staff will then issue a report of its findings as to whether autoclaves provide an additional margin of safety.

Revisions to the appropriate regulatory documents will be considered at that time.

At least two separate means should be utilized for determining the quantity of UF₆ loaded into cylinders or cold traps before applying heat to them. "Real time" quantification methods are preferred, such as load cells, mechanical scales, or flow integration. Alarms should be associated with the quantification methods.

Discussion:

The licensing staff agree with this recommendation and will take the actions necessary to incorporate this recommendation in license requirements. Staff were working with licensees to upgrade capabilities in this area prior to the Sequoyah Fuels accident. Allied Chemical has provided three methods for the independent determination of the quantity of UF₆ loaded into cylinders. These are flow totalizers and two separate independent scales.

Sequoyah Fuels Corporation has installed, as a part of the modifications made to the cylinder filling area, electronic load cells in the cylinder carts as well as the weighing platform scale. These load cells, coupled with the platform scale, provide two independent means of determining the weight of the cylinder. The scales are interlocked to the UF₆ filling valves to provide alarm capability and automatic termination of filling when the preset weight is attained.

As a part of the original design for the Sequoyah facility, load cells were installed to determine the quantity of UF₆ in the cold traps. These scales were not effective due to the interference of process lines and cold trap supports. SFC is currently investigating methods to modify the cold traps so that the load cells function in the proper manner. Input to the cold traps is currently controlled by the process production rate and input time for each cold trap.

Approach:

The licensing staff will require that independent methods of measurement be in place and operational as part of its review of Sequoyah Fuels Corporation request for restart. The staff will also survey other licensees using similar processes and provide recommendations and requirements as necessary. The appropriate regulatory documents will be revised to incorporate this requirement.

SECTION: 2.2. RECOMMENDATION #2 (Ref: 5)

Licensees should be required to establish maximum fill limits for cylinders and cold traps based on suitable standards.

Discussion:

The licensing staff agree with the recommendation and will take the actions necessary to incorporate this recommendation in license requirements.

Maximum fill limits for cylinders have been developed and implemented as part of the voluntary compliance with ANSI standards. Criteria may be found in ORO-651. Sequoyah Fuels Corporation and Allied Chemical have voluntarily established such limits on the basis of ANSI fill limits for cylinders for shipment. Filling of the cold traps is limited by the physical and chemical properties of UF_6 condensation in the trap to approximately 50 percent of the capacity of the cold trap.

The Department of Transportation has undertaken rulemaking to incorporate these limits into its regulations for transport of cylinders. The staff initiated contact with DOT shortly after the January 4 accident.

Approach:

The licensing staff as part of license reviews, will determine that licensees have established limits as part of the procedures which are required by license. The staff will request that the Regions inspect for the presence of these limits during routine inspection of facilities.

The staff will survey other licensees using similar processes and provide recommendations and requirements as necessary. The appropriate regulatory documents will be revised to incorporate this requirement.

Movement of filled, heated UF₆ cylinders should be minimized. The use of combination filling, weighing, heating, and sampling stations should be evaluated for the Sequoyah facility.

Discussion:

The licensing staff agree with this recommendation and will take the actions necessary to incorporate this recommendation in license requirements.

The staff were investigating the movement of heated UF₆ cylinders with licensees prior to the January 4, 1986 incident. Requirements were placed on the licenses of both Allied Chemical and Sequoyah Fuels to investigate the handling of cylinders. As part of the modifications made to the cylinder filling area, SFC has installed an in-line sampling system for UF₆ which is being loaded into cylinders. Operation of the in-line sampling system will eliminate the movement of heated cylinders to and from a steam chest for obtaining a sample. Under routine operations, cylinders containing liquid UF₆ will only require movement to the storage yard for cooling after their weight has been determined. Allied has also modified all stations to allow filling, weighing, heating, and sampling at one location without movement.

Approach:

License Condition No. 11 for Sequoyah Fuels Corporation required an evaluation of liquid UF₆ cylinder filling and handling. Staff will review and act upon the information submitted as part of restart.

The staff will survey other licensees using similar processes and provide recommendations and requirements as necessary. The appropriate regulatory documents will be revised to incorporate this requirement.

A requirement, generally analogous to 10 CFR 50.59 should be established requiring that certain NMSS licensed facilities perform engineering evaluations of proposed design changes to ensure that overall safety margins would not be compromised by the proposed changes.

Discussion:

The staff agree with this recommendation.

Approach:

The Office of Nuclear Regulatory Research has been requested to prepare a rule change to Parts 30, 40, and 70 to include wording similar to Part 50.59.

Overfilled UF_6 cylinders or filled cylinders which are found to be defective should be evacuated without increasing cylinder internal pressure above atmospheric and preferably without application of heat.

Discussion:

The licensing staff agree with this recommendation and will take the actions necessary to incorporate this recommendation in license requirements.

Allied Chemical and Sequoyah Fuels Corporation have committed to not heating overfilled cylinders. These licensees are currently investigating methods for removal of UF_6 from cylinders, including the feasibility of installing improved vacuum systems. While heating should be minimized or avoided, however, it remains a demonstrated method of UF_6 removal which is considered satisfactory when the liquid contents of the cylinder are less than cylinder capacity and appropriate pressure-sensing and venting equipment are installed and operational.

Sequoyah Fuels Corporation has provided for pressure-sensing equipment to be used when cylinders are heated. Pressures will be limited to a small fraction of the pressure required to rupture a cylinder. Sequoyah Fuels Corporation does not possess the equipment necessary to evacuate cylinders without heating. However the instrumentation and administrative safeguards provided for the heating operation provide an appropriate level of safety for the process of removing UF_6 from a cylinder.

Sequoyah Fuels Corporation has specifically committed to special case-by-case analysis and approval by management for any cylinder heating performed for cylinders containing UF_6 in excess of the amounts specified by ORO-651 and ANSI N14.1-1982. The NRC staff has incorporated, as a condition of the license, a limit above which heating of cylinders may only be performed with the approval of the NRC.

Approach:

The staff will survey other licensees using similar processes and provide recommendations and requirements as necessary. The appropriate regulatory documents will be revised to incorporate this requirement.

The frequency of hydrostatic testing of UF6 cylinders specified in ANSI N14.1-1982 should be reevaluated to resolve the differences in treatment of empty and filled cylinders.

Discussion:

Staff agree with this recommendation. To address the evident problem with the ANSI standard, staff have commented on DOT's proposed amendment to the Hazardous Materials Regulations for transporting Uranium Hexafluoride (Docket No. HM-166V; Notice No. 86-2). This response, dated June 16, 1986, highlights NRC's concern over the "exemption" of the ANSI 5-year testing standard given to filled cylinders and suggests that this issue be reevaluated for the final amendment package.

Approach:

Staff does not believe any specific actions related to this recommendation are required for the Sequoyah restart.

The DOT/NRC Memoranda of Understanding (44 FR 38690, published 7/2/79) gives DOT responsibility for development of safety standards for design and performance of LSA material packages. Staff will reconsider any further actions (with DOT coordination) after publication of DOT's above referenced amendment package.

At this time, staff does not foresee any actions which should be taken to improve the regulatory framework with relation to this recommendation.

Instrumentation for detecting UF_6 releases should be utilized in areas of potential airborne UF_6 releases and in conjunction with steam heating to detect UF_6 released to the steam condensate.

Discussion:

The licensing staff agree and will take the actions necessary to incorporate this recommendation in license requirements.

Allied Chemical and Sequoyah Fuels have investigated the detection capabilities and reliability of UF_6 detectors. UF_6 detection in condensate is a design feature provided by Sequoyah Fuels in the proposed depleted UF_6 to UF_4 conversion facility.

UF_6 in air rapidly hydrolyzes to UO_2F_2 resulting in a dense white vapor. Visual detection is possible for very small quantities of material. However, automatic detection capabilities are important to prevent reliance upon human observation and to detect problems in unattended areas.

The licensing staff and Region IV have observed during inspection that Sequoyah Fuels has installed UF_6 , HF, and F detectors for the cylinder filling area.

Approach:

The staff will request that licensees provide information on detection capabilities and will provide recommendations and requirements as necessary based upon review.

The appropriate regulatory documents will be revised to incorporate this requirement.

The instrumentation for detecting UF_6 releases should provide alarm and/or automatic protection functions (for example; containment, emergency ventilation, or effluent cleanup).

Discussion:

The licensing staff agree and will take the actions necessary to incorporate this recommendation in license requirements.

Automatic detection and alarm capabilities are necessary to provide early warning of equipment problems and health hazards without dependence on human observation. The UF_6 detectors installed by Sequoyah Fuels Corporation have alarm capabilities.

Approach:

The staff will, as part of actions taken for the previous recommendation (Ref: 10), determine that alarm and/or automatic protection functions are available with UF_6 detection systems. Recommendations and requirements will be provided as necessary. The appropriate regulatory documents will be revised to incorporate this requirement.

The individuals responsible for development, maintenance, updates, and implementation of the contingency plan should be clearly identified at both the corporate and site levels.

Discussion:

It has been the licensing staff's policy to have as part of the license, an identification of responsible positions within the management of the licensee.

In the revised license conditions for Sequoyah Fuels, the Manager, Health, Safety, and Environment of the Sequoyah facility is responsible for the development and implementation of the plan and implementing procedures. As the Contingency Plan Coordinator, the Manager, Health, Safety, and Environment periodically reviews and updates the plan and implementing procedures. The Sequoyah Facility Manager has final authority for onsite response matters and the General Manager, Sequoyah Fuels Operations, for corporate response matters.

This recommendation applies to all fuel cycle and material licensees who have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Audits of contingency plan implementation should be conducted by individuals not having direct implementation responsibility, and the audits should include evaluation of the appropriateness of the plan, procedures, facilities, equipment (including location of facilities and equipment), training, and periodic exercises in the spectrum of accidents or emergencies possible at the facility.

Discussion:

The revised Sequoyah contingency plan is subject to quarterly audits directed by the Director, Regulatory Compliance of the Environmental and Health Management Division, Kerr-McGee Corporation. The Sequoyah facility is audited to evaluate and verify adherence to the contingency plan and implementing procedures.

This recommendation applies to all fuel cycle and material licensees who have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

A systematic training program should be established to familiarize all plant personnel with the general contents of the contingency plan and appropriate response actions. Specific training should be provided to individuals (both site and corporate) who might be assigned specific response functions and responsibilities.

Discussion:

The current Sequoyah facility training program is designed to train all facility personnel, members of the onsite contingency response organization, and corporate personnel with radiation and chemical safety, plant operations, the contingency plan, emergency procedures, and implementing procedures. The extent of contingency plan training is dependent upon the job function and emergency response responsibilities.

This recommendation applies to all fuel cycle and material licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Offsite organizations who might be requested to support an emergency response should be invited to attend training specific to the response expected.

Discussion:

The staff generally agree with this recommendation. Emergency exercises may include direct participation by those offsite organizations that would respond to the site to help mitigate the accident, i.e., police and fire; and the exercise should test communications with other offsite emergency organizations. These other organizations would be expected to implement generic emergency plans during an incident.

Sequoyah Fuels Corporation has as part of the revision of its contingency plan briefed and provided training to local officials, the media, and potential local response groups such as police, civil defense offices, the county health departments, and cooperating hospitals.

This recommendation applies to all fuel cycle and material licensees that have a radiological contingency plan.

Approach:

The licensing staff will ensure that appropriate cooperative training is provided as part of its review of the revised contingency plan for Sequoyah Fuels which was submitted on May 27, 1986.

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Drills and exercises involving substantial staff response to a spectrum of simulated emergency situations should be conducted periodically. The simulated events should be based on prepared scenarios to demonstrate specific objectives, and they should be observed and critiqued by qualified personnel. Any deficiencies observed should be evaluated and responsibility for corrective action assigned and followed.

Discussion:

Sequoyah Fuels will conduct periodic drills and exercises to test, develop, and maintain skills in emergency contingency response. Exercises will be formal detailed scenarios, using observation and control personnel. Post-exercise critiques will be conducted, deficiencies identified, and remedial action responsibility assigned.

This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Drills and exercises should periodically include the offsite organizations which might be called upon for support (local police, civil defense, health departments, etc.), as well as corporate personnel (see Section 3.3).

Discussion:

The staff generally agree with this recommendation. Emergency exercises may include direct participation by those offsite organizations that would respond to the site to help mitigate the accident, i.e., police and fire, and the exercise should consider testing communications with other offsite emergency organizations. The staff believes that communications with offsite response groups should be tested annually. These other organizations would be expected to implement generic emergency plans during an incident.

This recommendation applies to all fuel cycle and material licensees that have radiological contingency plans.

The revised Sequoyah Fuels contingency plan requires a simulated emergency exercise for onsite personnel annually, and every 5 years an exercise will include offsite corporate personnel and other offsite response groups who desire to participate.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Consider requiring a designated Emergency Operations Center (EOC) onsite and an alternate EOC either offsite or in another onsite location which is unlikely to be impacted by the incident. The EOC and alternate EOC should contain adequate communications capability and accommodations to provide for coordination of the onsite emergency response activities and notifications and coordination with offsite supporting organizations. The EOC or alternate EOC should be accessible 24 hours a day.

Discussion:

Sequoyah Fuels has designated an onsite Emergency Operations Center which contains communications and accommodations for direction and control of the onsite emergency response effort. An offsite Emergency Operations Center has been acquired to support an onsite emergency response activity. Both centers are capable of providing notifications and coordination with offsite supporting organizations and are accessible 24 hours a day.

This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Locations of emergency equipment and kits should be reviewed by the NRC and licensees so that in the event of an emergency in a given facility location or inaccessibility of a large portion of the facility, access to adequate emergency equipment and facilities, including emergency decontamination facilities, can be assured. Equipment caches should be in multiple locations.

Discussion:

The staff will consider this recommendation in preparing a Regulatory Guide which will provide guidance on ways acceptable to the staff for compliance with the requirements established by regulation.

Sequoyah Fuels has provided emergency equipment in additional locations, including an offsite location, as part of an upgrade in their response capability.

This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

After the Commission issues a draft emergency preparedness regulation for fuel cycle and materials licenses, the staff will begin development of a Regulatory Guide which will provide details on how a licensee can comply with the regulation. The suitability of equipment and locations will be reviewed and inspected by the licensing staff and Region IV as part of the Sequoyah restart review and contingency plan review.

Consideration should be given to providing strategically placed "air capsule escape units" to allow workers to escape from portions of a facility in which there exists a potential for exposure to toxic fumes for more than a few moments.

Discussion:

The staff agree with this recommendation.

The fatality on January 4, 1986, resulted from prolonged exposure to UF_6 , UO_2F_2 , and HF fumes during escape without respiratory protection. Had appropriate respiratory protection been available, the consequences could have been mitigated. Sequoyah Fuels has installed air capsule escape units consisting of a full head hood and 5-minute air supply bottle in numerous locations throughout the facility.

Approach:

The licensing staff will request that licensees investigate current practice within their facilities and provide for NRC review, an analyses of each plant's safety. The staff will provide appropriate recommendations and requirements based upon review of the licensees' submittals. Consideration will be given at that time to revising the regulatory requirements.

The facility communications system should include a radio system compatible with local police or other offsite responder communications systems. In addition, the licensee should attempt to identify beforehand to local and state police, insofar as practical, offsite individuals who would be called on for support in the event of an emergency at the site. Radio communications with police officials during an emergency can resolve specific issues.

Discussion:

The staff will consider this recommendation in preparing a Regulatory Guide which will provide guidance on ways acceptable to the staff to demonstrate compliance with the requirements established by regulation.

Sequoyah Fuels Corporation has provided for radio communications with local police units as part of its revised contingency plan. Offsite organizations have been identified, briefed, and provided training by SFC.

This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

After the Commission issues a draft emergency preparedness regulation for fuel cycle and materials licenses, the staff will begin development of a Regulatory Guide which will provide details on how a licensee can comply with the regulation.

The events described in the radiological contingency plan required of certain NMSS licensees should be reviewed to develop a consistent analysis and classification of events. The resulting classification should be used in NRC decision criteria to initiate transition of the NRC from a Normal Mode to higher response modes.

Discussion:

The Sequoyah Fuels revised contingency plan provides for classification of events and for a graded onsite and offsite response to the events. Classification of events was one requirement of the 1981 Order requiring the preparation of Radiological Contingency Plans by certain NMSS licensees.

This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Training and guidance should be provided to Headquarters Operations Officers and Emergency Officers relative to the handling of nonreactor events. The NRC Regions should develop additional training and awareness of nonreactor events and suitable response modes, and should assure that radiological contingency plans and other facility information are readily available.

Discussion:

The staff agree with this recommendation.

The basic Headquarters Operations Officers' and Emergency Officers' procedures were reviewed and were found to adequately cover radiological events at fuel cycle facilities; however, events involving chemical hazards were not clearly addressed. The Headquarters Operations Officers' (HOO) and Emergency Officers' (EO) procedures have been revised to assure assessment of chemical as well as radiological hazards of reported events.

Training of HOOs and EOs to assure adequate assessments of nonreactor events must include event classification and those aspects of nonreactor accidents that can threaten public health and safety. The training can be provided to response personnel by IE; but, training material must be developed by NMSS.

Approach:

IE has requested that NMSS develop training materials on fuel cycle event classification and public safety aspects. IE will assure that all personnel responsible for initial assessment of reported events receive the training.

Periodic NMSS training exercises should include events at fixed sites and involve the NRC Operations Center and regional personnel.

Discussion:

The staff agree with this recommendation and will involve the NRC Operations Center and regional personnel in periodic NMSS training exercises at fixed sites.

IE has been working with NMSS over the past year to develop and train an organization for fuel cycle response. These capabilities were first exercised for a simulated transportation event and subsequently for a fuel cycle facility at Lynchburg, VA. An exercise that simulates a response to another fixed fuel cycle facility will be conducted.

Approach:

A working group composed of NMSS, IE, and the Regions will be formed to develop a fixed fuel cycle facility exercise scenario. This scenario will be used to conduct a fixed fuel cycle exercise in 1986.

If call-in of regional staff is anticipated or sustained communications are expected, early use of the Regional Incident Response Center should be considered to facilitate preliminary evaluation of the event and notification of the regional staff (if a fan-out notification is not used).

Discussion:

Use of the Regional Incident Response Center and/or Headquarters Center communications for situations requiring multiple phone lines is routine as was demonstrated during the Sequoyah event. No action is required to implement this recommendation.

When there is significant media interest locally during or following an event, regularly scheduled press briefings coordinated with licensee, NRC, and State responders should be considered. The current experience indicated the value of the "unified voice" approach for updating the status of an event. The result was the much reduced impact from separate inquiries to response team members.

Discussion:

The Office of Public Affairs agrees that regularly scheduled joint press briefings are a desirable goal, where feasible. FEMA would normally also participate. In any emergency, we intend to coordinate with the licensee, the State, and FEMA. However, in a fast-moving situation, there may come a time when we have to move quickly in the public affairs area and the logistics do not permit full coordination. Knowledgeable senior NRC technical staff at the site would normally participate in any joint briefings.

NRC should be prepared to initiate the installation of additional telephone lines early in an event at facilities with limited installed communications capability.

Discussion:

In the event of an emergency, NRC has ready access to the AT&T Federal Systems group for prompt installation of additional phone lines. Also, Boise Idaho Fire Cache has a portable satellite communications system which would be dispatched upon NRC request. Requests for this additional support would normally be made while the site team is on the way to the site. In addition, there are other Federal agencies that NRC may call upon for use of their portable telecommunication capabilities. Further, IE and Telecommunications are looking at an overall communications upgrade that will specifically address transportation events and events at facilities that are not equipped with an Emergency Notification System (ENS). No additional action is required.

NRC should have predetermined criteria for acceptable onsite and offsite contamination levels, preferably based on projected dose commitments or health impacts. Such criteria should be readily available and distributed so that ad-hoc acceptability criteria need not be generated under crisis conditions.

Discussion:

One issue here is the use of Protective Action Guides (PAG's) issued by EPA and others. Because of the wide variety of radionuclides, chemical and physical forms, and exposure pathways, it is not feasible to set predetermined radionuclide quantity limits. This must be done on a case-by-case basis using the appropriate dose related PAG. The staff will review existing PAGs to ensure that a complete set is available for use in emergencies. These guides generally apply to the short-term protective actions while the situation is being stabilized.

For the long term, NMSS in concert with EPA developed criteria for acceptable concentrations for uranium and thorium in soil, based on dose commitments. These were provided to the team responding to the Sequoyah accident. We have also developed criteria for other radionuclides, using the same dose commitments. Acceptable levels for surface contamination on equipment and buildings have also been developed for most radionuclides. Both sets of criteria have been published as Branch Technical Positions and are used during decommissioning of fuel cycle facilities. They are:

1. "Disposal or On-Site Storage of Thorium or Uranium Wastes from Past Operations," October 1981. Option 1 provides acceptable concentrations of uranium and thorium in the environment:

U-235	30 pCi/gm	Natural Uranium	10 pCi/gm
U-238	35 pCi/gm	Natural Thorium	10 pCi/gm

2. "Guidelines for the Decontamination of Facilities and Equipment Prior to the Release for Unrestricted Use, or Termination of Licenses for the Use of Source, Byproduct, or Special Nuclear Material," July 1982.

These criteria treat radiological risk alone. For chemical hazards or special chemical forms which influence pathways to radiological risk, the possibilities are so many and varied that they must be considered on a case by case basis using the basic criteria listed above as a starting point.

The NRC team responding to contamination events should include an individual or individuals responsible for coordinating sample collection and data analysis. (For a response to a reactor event, an Environmental Team Leader would normally be dispatched with the initial Site Team.) The person assigned the sample and data coordination function should be retained in that position sufficiently long to assure sampling, analyses, and data handling consistency. If personnel assignments are changed, sufficient turnover time must be allowed to assure smooth transition. Specific training, exercises, and drills should be conducted in sample collection and data handling. The sample data should be entered into a computerized data base as early as possible for ready analyses and sorting by all parties with need for the data.

Discussion:

DOE has an agency mandate to provide radiological assistance to offsite authorities in order to protect the public health and safety in a radiological emergency. It carries this out through the Radiological Assistance Program (RAP) and the Aerial Measurements Systems (AMS). It should be recognized that in any incident where there is a real or potential threat of a significant radiological release, NRC, the State and/or the licensee may and should call upon DOE to provide radiological assistance. Under the Federal Radiological Emergency Response Plan (FRERP), DOE has the responsibility, during the emergency phase of a radiological incident, to coordinate the offsite radiological monitoring, assessment, and evaluation and to provide their assessments to the cognizant Federal Agency and the affected State(s). NRC cannot and should not duplicate these existing and extensive capabilities. However, a member of the NRC site team should be responsible to assure that any NRC monitoring activities are coordinated with DOE when they arrive and assume responsibility for interfacing with DOE by being the primary contact with the DOE RAP teams or the FRMAC (Federal Radiological Monitoring and Assessment Center).

Approach:

The NRC regions and the NRC Headquarters response teams will be reminded to call on DOE for radiological assistance for any event where there is a real or potentially significant radiological release to the environment.

The need for establishing standardized sampling and sample preparation procedures and the means of intercomparing laboratory results should be recognized and met early in any event involving multiple organizations.

Discussion:

As noted in response to Section 3.2.2.2, Recommendation #4 (Ref: 29), in any event of any possible consequence, DOE will be called upon to coordinate the offsite monitoring activities which includes the establishment of standardized sampling, sample preparation, and calibration procedures. DOE is prepared to carryout this task and has the staff, facilities, procedures, and organization to implement these activities. Therefore, no action is required to implement recommendations.

In the event of an emergency involving an impact on public health and safety, other Federal agencies may need to respond on a timely basis with personnel, equipment, or procedures for obtaining pertinent information. These agencies should be notified of an event as early as possible (see Section 3.2).

Discussion:

Since the Sequoyah Fuels accident, the Operational Response Procedures between NRC, DOE, EPA, and HHS has been revised to include USDA as a full participant in these procedures. These procedures have been reviewed and the staff believes that current thresholds for notifying these agencies are adequate. However, we have written to each of these agencies and requested their comments as to the adequacy of the notification thresholds. We have also conferred with HHS (FDA) and EPA (ORP) to reconfirm previous arrangements that each of these primary agency contacts has accepted the responsibility to make further contacts within their agencies, i.e., in HHS, FDA will notify CDC and NIOSH and in EPA, ORP will inform CERCLA staff. In accordance with NUREG-0981, FEMA continues to notify other Federal agencies of any incident where NRC goes into Standby Mode.

Personnel of local agencies that might be called upon to respond to emergencies should be given training (see Section 3.1.2, Training).

Discussion:

The revised Sequoyah contingency plan calls for local offsite response agencies, including police departments, highway patrol, and health department personnel, to be instructed in the areas of the plan which affect their ability to respond to an emergency when needed.

Note that offsite agencies should not be required to be trained; they should be invited to the training. This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

NRC should consider routine use of a "hot line" (a rumor control line) in response to nonreactor events. (State and local emergency plans for reactor sites presently require "hot line" (rumor control) provisions).

Discussion:

Public Affairs officers in Headquarters and the Regions currently perform the function of rumor control for the NRC. A Public Affairs Officer is also dispatched to the site in the event of an emergency. All are available to answer telephone inquiries from members of the public and press. We agree that a state or local central line similar to that used for reactor sites would also be desirable.

Approach:

It is important that the Office of Public Affairs be provided with the latest technical data at all times in order to fulfill its rumor control function.

The staff will incorporate the recommendation for state and local rumor control arrangements into a Regulatory Guide that will provide guidance on ways acceptable to the staff for compliance with the requirements established by regulation.

Hospital staff who might reasonably be expected to deal with injuries from a major accident should be trained to deal with all aspects of the injuries. Radiological plans and their use in drills are desirable (See Section 3.1.2, Training).

Discussion:

The Sequoyah Fuels revised contingency plan has included medical support personnel in their training program. Hospital staff who might be expected to treat workers who are contaminated and/or have chemical injuries will receive training to deal with such injuries resulting from an accident.

Note that the hospital staff should not be required to be trained; they should be invited to be trained. This recommendation applies to all fuel cycle and materials licensees that have a radiological contingency plan.

Approach:

The staff will consider this and any additional recommendations made in this area as part of the ongoing emergency preparedness rulemaking for fuel cycle and other radioactive material licensees. Other regulatory documents will be revised as appropriate, following issuance of the final rule.

Radiological contingency planning should include site control plans and *methods for implementing site access control*. Local law enforcement groups that might be called on in an emergency should be trained (see Section 3.1.2).

Discussion:

The staff will consider this recommendation in preparing a Regulatory Guide which will provide guidance on ways acceptable to the staff for compliance with the requirements established by regulation.

The Sequoyah contingency plan includes an Administration and Security Coordinator who is responsible for maintaining facility security and access control during and after an emergency. Local police departments can be called upon for security, access, and traffic control assistance and will be trained in the areas of the plan which affect their ability to respond to an emergency.

This recommendation applies to all fuel cycle and materials licensees that have radiological contingency plans.

Approach:

After the Commission issues a proposed emergency planning regulation for fuel cycle and materials licensees, the staff will begin development of a Regulatory Guide which will provide details on how a licensee can comply with the regulation.

An opinion should be prepared for publication in 10 CFR Part 8 that precisely defines the scope of NRC regulatory authority with respect to nonradiological hazards in industrial, chemical, and other plants operating under NRC license. The opinion should address the nonradiological hazards of the licensed materials and the reaction of those materials with process and other chemicals present at the plant.

Discussion:

The LLG Report indicates a problem regarding the scope of agency jurisdiction over chemical hazards that needs to be authoritatively resolved. The recommendation suggests a reasonable way of doing so. OGC has an attorney reviewing the legislative history of the Atomic Energy Act and related legislation, as well as reviewing relevant cases, and intends to prepare a legal memorandum on the subject.

Approach:

The approach is to prepare a thorough legal analysis of the scope of NRC authority vis-a-vis hazardous chemical effects of licensed materials and related activities.

A Memorandum of Understanding (MOU) should be concluded with the Department of Labor covering the OSHA-NRC interface. The MOU should incorporate the conclusions of the opinion developed under recommendation 1, and should describe in detail the scope of hazards subject to Atomic Energy Act regulation. Under the MOU, occupational hazards that are then not precisely the regulatory responsibility of NRC would be under OSHA regulatory jurisdiction.

Discussion:

The NRC through IE will negotiate with OSHA, Department of Labor, an interface MOU to facilitate coordination and cooperation concerning employee health and safety in NRC licensed facilities. This MOU will detail the scope of each agency as to the hazards regulated within these facilities.

Approach:

NRC will approach this MOU by scheduling meetings between NRC and OSHA personnel to scope the regulatory authority for each agency and develop a mutually acceptable expression of that authority. A guide will also be developed which can be changed as personnel and regulations change and which will incorporate the provisions of the current, unsigned guidelines.

NRC licensees should be reminded through an IE Information Notice of their obligation to report releases above reportable quantity limits to the National Response Center and the potential of a criminal penalty under CERCLA for failure to do so.

Discussion:

Although enforcement of the requirement to report to the National Response Center is not the responsibility of the NRC, it is an important safety requirement and necessary to activate the nonradiological response to a chemical release.

Approach:

IE will issue an information notice that reminds licensees of the NRC requirement to report releases of radioactive materials in accordance with 10 CFR 20.403. The information notice will also state that under CERCLA, releases above specified limits must be reported to the National Response Center.

The criteria of draft NRC Manual Chapter 0513 should be reexamined relative to clarification of the use of an IIT versus the use of an AIT following events involving offsite consequences or multi-agency response.

Discussion:

The Appendix of NRC Manual Chapter 0513, NRC Incident Investigation Program, defines a significant operational event (SOE) as "[a]ny radiological, safeguards, or other safety-related operational event at an NRC licensed facility which by its consequences, poses an actual or potential hazard to public health and safety, property, or the environment." (Emphasis added) The appendix further states that IIT's perform the single NRC investigation of significant operational events, and defines several characteristics that may be present in an SOE. These characteristics include:

1. [a] significant radiological release....
3. [a]ppears to involve a major deficiency in design, construction, or operation having potential generic safety implications.
4. [a]n event that lead to a site emergency.
8. [a]n event that is sufficiently...unique...to warrant an independent investigation or an event which warrants an investigation...to best serve the needs and interest of the Commission.

AEOD believes that an incident having the characteristics of the Sequoyah event could be judged to be an SOE for several reasons:

- Roads were closed around the plant for some time. - This action taken by the licensee implies the event had either an actual or potential hazard to public health and safety, and as such, met the definition of an SOE.
- NUREG-1140, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees, contains a theoretical analysis of a UF₆ release approximately equal to that of the Sequoyah event. The analysis demonstrates that possible permanent kidney damage could occur under adverse weather conditions and plausible transient kidney damage could occur under typical conditions. (The damage results from chemical toxicity of uranium, a radioactive material.) - These calculations imply that the amount of material released at Sequoyah represented "a major radiological release," a possible characteristic of an SOE.
- Both American UF₆ conversion facilities heat large UF₆ cylinders in steam chest. - The Sequoyah cylinder rupture might have represented

an event having generic safety implications, a possible characteristic of an SOE.

- The licensee in their Radiological Contingency Plan used the reporting characteristics of 10 CFR 10.403, Notification of Incidents, to define the categories of events. The rupture of a UF₆ cylinder was given as an example of a "General Emergency," a higher level of event than a "Site Emergency." Although the licensee did not declare the event to be either a general or site emergency, NRC personnel could use the emergency plan to assess the licensee's perception of the event's significance. - The licensee's Radiological Contingency Plan implies the event represented at least a site emergency.
- The Sequoyah event was unique and resulted in: evacuation of the plant; major responses by licensee management and NRC Region IV personnel; and local and national media attention. - The event could have warranted an independent investigation based on its uniqueness or the needs and interest of the Commission, a characteristic of an SOE.

AEOD believes that the subject manual chapter, currently under final review, meets the intent of the recommendation.

The use of an IIT rather than an AIT follows from the significance of the event. The appendix to the chapter contains at least five measures by which the significance of the Sequoyah event could be judged. We note specifically that:

- With regard to offsite consequences, events having offsite consequences may be judged to be significant operating events based on the definition of an SOE, or characteristics 1, 3, 4, or 8 given above.
- With regard to events involving multi-agency response, we view such response as following from the significance of the event. As such, we do not believe that it should be defined as a separate characteristic of an SOE. We also note that characteristic 4 or 8 above could capture an event involving multi-agency response as one that should be evaluated as an SOE to serve the needs and interests of the Commission.

AEOD believes that the Manual Chapter does not require revision, and, had the Chapter been available at the time of the Sequoyah event, it could have been used to determine whether or not an IIT was more appropriate than an AIT investigation. We have, however, reexamined the IIT procedures and added additional examples of events warranting consideration of IIT's using the LLG report and recommendation.

The Federal Radiological Monitoring and Assessment Plan (FRMAP) should be utilized to collect and assess data relative to the health effects of an incident. Current NRC response plans provide for interfacing with FRMAP and for providing direction to FRMAP agencies, therefore a separate health effects task force may not be necessary. If a task force is formed, however, it should be set up to utilize FRMAP-generated data and assessments without impacting on the response to the incident.

Discussion:

As noted in the response to Recommendation No. 4, Section 3.2.2.2 (Ref: 29) DOE will be called upon early in a response to an event to provide extensive *offsite monitoring assistance*. In a significant event, DOE will establish a Federal Radiological Monitoring and Assessment Center (FRMAC) which will coordinate all monitoring activities including those of the State and licensee. In addition, one key aspect of the FRMAC activities is an assessment group composed of representatives of all the Federal technical agencies, the State(s) and the licensee to assess the field data. Whether a health effects group will be part of this FRMAC assessment team or a separate health effects group is established at a different location, the FRMAC-generated data and assessments should be the basis for their work. This policy will reiterated to all NRC region and Headquarters response teams.

Approach

NRC Regions and Headquarters response personnel will be reminded to call on DOE for radiological assistance for any event where there is a real or potentially significant radiological release to the environment.

SECTION: 6 RECOMMENDATION #2 (Ref: 41)

Data should be entered into a computerized data base as early in the event as possible and the data base should be made available to the appropriate federal and state agencies to enable them to more easily assist in the evaluation of health effects.

Discussion:

Environmental monitoring data analysis would be part of the DOE response as discussed in Section 6, Recommendation #1 (Ref: 40). Therefore, no action is required if this recommendation concerns environmental data. Other types of data would need to be considered on a case-by-case basis.

Recognizing the need to issue the report of the assessment of the short-term health effects promptly, a schedule should be established within that report to ensure the assessment and followup of the longer range effects. The latter should be included in a supplemental report.

Discussion:

The licensing staff generally agree with this recommendation.

When the Health Effects Reports were issued, arrangements were made for the licensee to perform followup testing of the environment (soil and vegetation) and personnel. A supplemental report was not anticipated, but could be issued if the followup testing so indicates.

Additional consideration should be given to the intended audience for the reports. Because of the potential impact on plant employees and nearby residents, the report (or at least the Executive Summary) should be written in language understandable to the general population. Sufficient copies of the report should be made available in the local area to enable interested persons to obtain them.

Discussion:

We understand and appreciate the comment. It is difficult to produce a consensus report, written by technical people, which is necessary to make technical decisions on a very short time frame, and make it readily understandable to the general population. The first order of importance is to state the technical facts accurately in a way which professionals understand them and can take action. Reports aimed at the public tend to be less precise. However, if such a task comes up in the future, consideration will be given to such options as hiring a technical editor from the outset to develop a version for public consumption.

A formal system should be developed within the Office for Analysis and Evaluation of Operational Data (AEOD) for obtaining, evaluating, and disseminating information and reports concerning incidents involving NRC licensed activities and for DOE and foreign facilities. This also would permit AEOD to establish a more complete database of information for use in NRC licensing and inspection programs, and in the development of requirements for training and operational procedures.

Discussion:

AEOD already has a system in place to receive reports of events submitted by NRC licensees. These reports are normally entered into the Reactor Information Distribution System (RIDS) by the Region; depending on the category assigned to the event in the RIDS, NMSS and IE receive copies. Reports from Agreement State licensees are received from State Programs. The LLG Report points out the fact that events at DOE and foreign facilities may be of interest. AEOD agrees that non-licensee events at DOE and foreign fuel cycle and large material processing plants may provide valuable operational data applicable to NRC licensees and the regulatory process.

Approach:

AEOD will review and revise, as necessary, its system for obtaining and disseminating information from reports concerning certain DOE and foreign facilities, and NRC licensees. This review will consist of the following actions:

- (a) Contact DOE to arrange to have NRC receive reports of events at their fuel cycle and material processing facilities.
- (b) Contact International Programs to discuss how best to meet our need to receive, on a timely basis, reports of events at foreign fuel cycle and material processing plants.
- (c) Review the Radiological Contingency Plans submitted under the NRC Orders (1980) to determine what events licensees themselves track.
- (d) Contact Inspection and Enforcement to discuss how best to obtain information on events that certain nonreactor licensees themselves track.

When the above actions have been undertaken, AEOD will develop an AEOD procedure covering domestic and foreign event reports at fuel cycle and large material processing plants to assure collection, analysis, and feedback of the events.

The requirements and guidance for reporting potentially significant events at fuel facilities and at certain other materials licensees should be reviewed to ensure that all potentially significant events are reported to NRC.

Discussion:

The reporting requirements for nonreactor licensees are embodied in a number of sections of 10 CFR Parts 20, 30-35, 40, 50 (reprocessing plants), 70-73, and 150, or in license conditions. Generally, reporting requirements for incidents are limited to those in 10 CFR 20.403, some of which are duplicated in other sections of the regulations. By and large, the reporting requirements have fairly high thresholds, and represent requirements to report events that have occurred (or are threatening to occur) and that have had some impact. Precursor events per se may not fall into existing reporting requirements.

At this time, there is not an existing database to demonstrate whether different reporting requirements would result in reports of significant precursor events.

Approach:

Changes in reporting requirements can only be effected through changes in regulations and as such, represent long time line items. Before a commitment to change regulations can be made, authority to undertake rulemaking must be obtained from the EDO.

Using information generated in response to Section 7, Recommendation 1, AEOD will develop, in conjunction with NMSS, IE, and RES: a definition of those nonreactor licensees for which revised reporting requirements might be appropriate; a preliminary set of revised reporting requirements; and either a draft of the letter to the EDO requesting authorization to initiate rulemaking, or an analysis of why changed requirements are not needed.

RES will undertake submission of the request to the EDO, and follow on.

All efforts on this task are long-term.

A Standard Review Plan for review of fuel facility license applications, including those for UF₆ conversion facilities, should be established, implemented and maintained. Licensing guidance should also more definitively identify those areas of an applicant's operations which require the development and implementation of procedures and formalized training. This guidance should be in sufficient detail to permit the applicant to develop an acceptable program.

Discussion:

The staff agrees with this recommendation, and has an ongoing effort to develop standard review plans (SRP's) for all fuel cycle licensing activities. However, considering the upgrading that is taking place on the only two UF₆ plants through the license reanalysis process, the SRP, and guides in this area are considered a lower priority.

Approach:

The recommendations contained in the Lessons Learned Group Report and appropriate recommendations from the group currently evaluating the licensing and inspection of materials licenses will be considered in the development of SRP's and the revision of Standard Format and Content Guides.

NMSS should ensure that license reviewers have sufficient technical capability to more broadly evaluate the indirect effects of process equipment, facilities, and procedures on radiological safety. Such assurance can be obtained by increasing the training and qualifications of individual reviewers, contracting for outside expertise, or increasing the use of other NRC personnel with the necessary expertise.

Discussion:

We agree with this recommendation and believe that our existing staff and contractors have sufficient and varied expertise and operational knowledge of major fuel facilities to conduct such reviews. In recent years, however, since all of the fuel cycle facility licensing has been done for the renewal of existing licenses, less emphasis has been placed on operational safety reviews, except as they relate to nuclear criticality or radiation safety. In future renewal reviews, operational safety will be reemphasized. The matter of staff qualifications is also being examined by the Materials Safety Regulation Review Study Group which might also have recommendations in this area. The final approach will take this into account.

Approach:

The Format and Content Guides and Standard Review Plans will be revised to reemphasize operational safety.

NMSS has asked IE to consider an NMSS/IE/Regional onsite performance assessment team review that would combine some aspects of both SALP and PAT. This team inspection would be performed in conjunction with the license renewal review. This would also be an opportune time to evaluate over all process safety. NFS Erwin, Tennessee, has been chosen to test this approach. With respect to training, as qualified experienced staff are replaced by new employees, needed specialized training will be considered on a case-by-case basis. This is currently being done in the area of nuclear criticality, for example.

The current license format used by NMSS should be evaluated to determine the need to more clearly identify licensee commitments incorporated into a license to ensure recognition of all applicable commitments, specifications, and requirements.

Approach:

The staff believe the license requirements are clear, however there might be room for improvement. Currently there is an independent panel, the Materials Safety Regulation Review Study Group, which is reviewing the licensing and inspection of radioactive materials. Action on this recommendation should be held in abeyance pending completion of this evaluation.

NRC should review each of the recommendations in Chapter 2 of this report and determine whether specific changes should be made in license requirements and licensing criteria. The need for any changes should be communicated to applicable NRC licensees and other fuel facilities.

Discussion:

The staff agrees with this recommendation, and is addressing each Chapter 2 recommendation, as appropriate, for Sequoyah Fuels prior to restart.

Approach:

All Lessons Learned Group (LLG) recommendations are being evaluated to determine to which licensees they apply. Where changes in license requirements are indicated for other licensees, these changes will be made. All affected licensees will be sent a copy of the LLG report. The letter transmitting this information will suggest that the licensees give serious consideration to the reports recommendations. Each license will be evaluated to determine if individual recommendations are appropriate.

SECTION: 8.2. RECOMMENDATION #1 (Ref: 50)

Consideration should be given to having the IE Emergency Preparedness Branch review radiological contingency plans for nonreactor facilities. The use of this group could make available the expertise developed in reviewing reactor plans, and could enhance communications with the NRC Operations Center personnel.

Discussion:

This recommendation was discussed between IE and NMSS, and although IE and NMSS agreed that it was a good recommendation for the reasons stated in the recommendation, IE felt that they did not currently have either the resources or the fuel-cycle emergency preparedness expertise to assume this activity. Acceptance of this recommendation will be held in abeyance pending further discussions between the Directors of IE and NMSS.

The Standard Review Plan (NUREG-0810) and the Standard Format and Content document (NUREG-0762) should be reviewed to ensure that they are adequate or revised, if appropriate. The radiological contingency plans for fuel facility and materials licensees should then be reviewed against the revised guidance to ensure that they meet the acceptance criteria.

Approach:

The staff will review the contingency plans of fuel cycle and materials licensees to determine their agreement with the recommendations in NUREG-1198. Those found to not be in agreement will be requested to consider this recommendation in updating their contingency plan.

After the Commission issues a proposed emergency preparedness regulation for fuel cycle and materials licensees, the staff will start to revise NUREG-0810 and NUREG-0762.

The inspection program procedures contained in IE Manual Chapter 2600 should be revised to better emphasize inspection program aspects relative to procedures, hardware, and personnel training and qualifications that indirectly affect radiological safety and radioactive material control.

Discussion:

Currently, the fuel facility inspection program requires inspection of operator training (IE 88010) and operational safety (IE 88020).

Approach:

The two inspection procedures (88010 and 88020) will be revised to provide greater emphasis on plant operational safety. An examination of this area under a planned temporary instruction will form the basis for these revisions. During an interim period, inspections of operational safety will be conducted at each major fuel facility to the extent that the required topics have not yet been covered by regional inspections during the preceding six months. The results of these inspections will be helpful in determining the details of the planned inspection procedure revisions.

Anticipated inspection resource expenditures allotted by IE for major fuel facilities should be clearly identified for each individual facility, rather than being identified collectively and reassessed with consideration of variations in complexity of facility operations and associated hazards that directly or indirectly affect radiological safety.

Discussion:

The information on resources allotted for each major fuel facility is available and will be provided to the Regional offices. The allocation for each major facility was based on the complexity, size, and degree of hazard of the operation and the corresponding inspection time required to carry out the NRC inspection program for the facility. *Regional offices have the freedom and responsibility under the pertinent IE Manual Chapter (2600) to expend those resources as needed depending on the inspection and enforcement history of a facility, the number of incidents and allegations involving the facility, and other conditions that indicate the need for more, or for less inspection.*

Approach:

The resource allotment for major fuel facilities will be provided to each Region as an attachment to the Regional resource tables.

Efforts should be made by Regional offices to assure continuity in the designation of inspectors assigned to inspect major fuel facilities.

Discussion:

IE agrees that a fuel facility inspector should be familiar with the processes and license conditions for the fuel facilities he/she inspects. Assigning an inspector to the same plants for a reasonable number of years is an appropriate way to ensure achievement of that objective. With the possible exception of Region IV, each Region has assigned one inspector who has had overall responsibility for the safety inspections at the fuel facilities in the Region for a number of years. In addition, at the Nuclear Fuels Services plant in Erwin, Tennessee, the same resident inspector has been assigned since 1979. Consequently, there has been a considerable continuity in the inspection process over the years at the fuel facilities.

Approach:

In the revision to its fuel cycle inspection program, IE will state in IE Manual Chapter 2600 that training and assignment of fuel facility inspectors should be of sufficient duration to ensure that inspectors are appropriately familiar with the plant to be inspected and the associated license conditions. At the same time, the program will also be revised to ensure that, for Regions with small fuel facility programs, the inspections by the one or two knowledgeable people from the Region will be supplemented from time to time with inspection staff from other Regions and/or Headquarters.

In this way, the fuel facility inspection program will benefit from continuity of Regional inspectors while also benefiting from the possible new insights that an inspector from outside the Region will bring to the inspection of a particular plant.

Personnel associated with the establishment and implementation of inspection programs for major fuel facilities should be trained in aspects of the processing and handling of licensed material that directly or indirectly affect radiological safety and control of the material, as well as radiological contingency planning.

Discussion:

See Section 9.2, Recommendation #2, (REF: 56), which covers generally the same subject.

The inspector qualification procedures contained in IE Manual Chapter 1231, Inspector Qualifications, should be amended to broaden the required qualification and formal training of fuel facility inspectors to develop overall expertise in the facility operations.

Discussion:

IE Manual Chapter 1231 contains basic training requirements for fuel facility inspectors. IE had previously considered formal training courses for fuel facility inspectors. This training was discussed with various contractors who might supply the necessary instruction, however, it could not be conducted by any of the persons contacted due to the uniqueness of the processes of each facility that would be inspected. The number of personnel that would be involved in such a course would be small, making it difficult to justify the cost of designing a course that would be taught infrequently.

Approach:

The Regional offices will continue to train new personnel by accompanying experienced inspectors on fuel facility inspections. IE will set up a series of in house seminars for experienced personnel and new personnel for discussion of the plant processes and associated operational safety problems. The IE Manual Chapter on training requirements will be reviewed and revised to take advantage of any additional training opportunities. This is an interim measure. The Materials Safety Regulation Review Study Group is also looking into this matter and a final plan will be developed after their report is received.

Technical publications and information relevant to the technology, including standards and processes employed in fuel facility operations, should be referenced in IE inspection program procedures to provide guidance to inspection personnel.

Discussion:

Current fuel facility inspection procedures contain references to pertinent Regulatory Guides and NUREGs.

Approach:

A list will be developed of other references that may be useful in the conduct of the inspection program. The inspection procedures will be revised to list these additional references.

Since the current number of inspection personnel with fuel facility expertise and experience is limited, better utilization of these personnel appears necessary. This can be accomplished by interregional utilization of such personnel, consolidation of fuel facility inspection responsibility into fewer Regions, or conduct of periodic team inspections by the Region using appropriate specialists.

Discussion:

This recommendation will be taken under advisement. This is a matter which is also being examined by the Materials Safety Regulation Review Study Group. After their report is received, a review will be undertaken to determine the most advantageous method to utilize the inspection expertise available for fuel cycle facility inspections.

NRC FORM 335 (11-81)		U.S. NUCLEAR REGULATORY COMMISSION BIBLIOGRAPHIC DATA SHEET		1. REPORT NUMBER (Assigned by DDC) NUREG-1198 Supplement No. 1	
4. TITLE AND SUBTITLE (Add Volume No. if appropriate) Release of UF ₆ From a Ruptured Model 48Y Cylinder at Sequoyah Fuels Corporation Facility: Lessons-Learned Report NRC Staff Responses to the Recommendations Made by the Lessons-Learned Group		2. (Leave blank)		3. RECIPIENT'S ACCESSION NO. Lessons-Learned Group	
7. AUTHOR(S)		5. DATE REPORT COMPLETED MONTH August YEAR 1986		6. (Leave blank)	
9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) U.S. Nuclear Regulatory Commission Washington, DC 20555		DATE REPORT ISSUED MONTH August YEAR 1986		6. (Leave blank)	
12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Same as above		10. PROJECT/TASK/WORK UNIT NO.		8. (Leave blank)	
13. TYPE OF REPORT Regulatory Topical		PERIOD COVERED (Inclusive dates)		11. FIN NO.	
15. SUPPLEMENTARY NOTES		14. (Leave blank)		10. PROJECT/TASK/WORK UNIT NO.	
16. ABSTRACT (200 words or less) The uranium hexafluoride (UF ₆) release of January 4, 1986, at the Sequoyah Fuels Corporation facility has been reviewed by a NRC Lessons-Learned Group. A Model 48Y cylinder containing UF ₆ ruptured upon being heated after it was grossly overfilled. The UF ₆ released upon rupture of the cylinder reacted with airborne moisture to produce hydrofluoric acid (HF) and uranyl fluoride (UO ₂ F ₂). One individual died from exposure to airborne HF and several others were injured. There were no significant immediate effects from exposure to uranyl fluoride. This supplement report contains NRC's response to the recommendations made in NUREG-1198 by the Lessons Learned Group. In developing a response to each of the recommendations, the staff considered actions that should be taken: (1) for the restart of the Sequoyah Fuels Facility; (2) to make near-term improvement; and (3) to improve the regulatory framework.					
17. KEY WORDS AND DOCUMENT ANALYSIS Uranium hexafluoride release, Sequoyah Fuels Corporation Facility, cylinder rupture, lessons learned, licensing and inspection of fuel facilities, radiological safety, chemical hazards, response to recommendations.		17a. DESCRIPTORS			
17b. IDENTIFIERS/OPEN-ENDED TERMS Radiological safety, chemical hazards, emergency preparedness, licensing, inspection.		19. SECURITY CLASS (This report) Unclassified			
18. AVAILABILITY STATEMENT Unlimited		20. SECURITY CLASS (This page) Unclassified		21. NO. OF PAGES	
				22. PRICE \$	

